REMARKS

The Applicants thank the Examiner for a thorough search, and for considering the Information Disclosure Statement filed on July 27, 2004.

I. STATUS OF CLAIMS

Claims 1-65 are pending. Claims 1-65 have been rejected.

Claims 1, 5, 9, 13, and 14 are herein amended to improve the readability of the claims. Claim 29 is herein amended to address an informality. These amendments do not narrow claims 1, 5, 9, 13, 14, and 29, and are unrelated to patentability.

II. SUMMARY OF REJECTIONS

Claims 1, 3-5, 7-9, 11-17, 19-21, 24, 27-28, 31-34, 36-38, 41, 44-45, 48-51, 53-55, 58, 61-62, and 65 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Derby et al.* (U.S. Pat. No. 5,359,593) in view of *Fichou et al.* (U.S. Pat. No. 6,765,873).

Claims 22, 39, and 56 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Derby et al.* in view of *Fichou et al.*, and further in view of *Dillon et al.* (U.S. Pat. No. 6,473,793).

Claims 23, 40, and 57 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Derby et al.* in view of *Fichou et al*, and further in view of *Bushmitch* (U.S. Pat. No. 5,928,331).

Claims 29, 30, 46, 47, 63 and 64 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Derby et al.* in view of *Fichou et al*, and further in view of *Haddock et al.* (U.S. Pat. No. 6,104,700).

Claims 2, 6, 10, 18, 25, 26, 35, 42, 43, 52, 59, and 60 have been rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over *Derby et al.* in view of *Fichou et al.*, and further in view of *Koskelainen et al.* (U.S. Pat. No. 6,570,851).

These rejections are respectfully traversed.

III. INDEPENDENT CLAIMS 1, 5, 9, 13, AND 14

A. Neither *Derby et al.* nor *Fichou et al.*, taken individually or in combination, teaches, discloses, or suggests all the elements recited in Claims 1, 5, 9, 13, and 14

Claim 1 recites

> marking a first group of one or more packets of ***a data flow*** with a first behavioral treatment value, ...;
> determining ***an achieved flow bandwidth*** for ***the data flow*** based on data traffic within the network;
> determining ***a second behavioral treatment*** value based ***on the achieved flow bandwidth for the data flow*** within the network; and
> marking a second group of one or more packets ***of said data flow*** with said second behavioral treatment value, wherein the ***second behavioral treatment value directs devices within the network*** to treat the second group of one or more packets ***with a second quality of service treatment*** ...(emphasis added).

Claims 5, 9, 13, and 14 include similar language. Thus, in Claim 1, an achieved flow bandwidth is determined for a data flow of packets, the second behavioral treatment value is based on the achieved flow bandwidth determined for the data flow, and a second group of packets in the data flow is marked with the behavioral treatment value in order

to direct devices in the network that the second group of packets is to be treated with a different quality of service treatment.

In contrast, neither *Derby et al.* nor *Fichou et al.*, taken individually or in combination, describe, teach, or suggest "determining an achieved flow bandwidth for the data flow based on data traffic within the network." The Office Action, in page 3, states that this element is disclosed in *Derby et al.* in col. 6, lines 21-27. This is incorrect.

Derby et al. describes that a bandwidth request message is sent along a computed connection path **before** a connection is set up. If anywhere along the path it is determined that "insufficient bandwidth is available due to changes in traffic patterns, a denial of the connection request is transmitted back to the source endnode." (Col. 6, lines 9-12.) "If sufficient bandwidth is available in each link of the connection along the computed path, the destination endnode ... transmits back the acceptance of the connection." (Col. 6, lines 5-9). Thus, at most *Derby et al.* teaches measuring the bandwidth of a connection path **before** a connection is set up.

Derby et al. continues in Col. 6, lines 21-27, to state that if the connection is accepted and set up, then

> [a]t the same time estimation and adaptation module 33 begins monitoring this incoming traffic to determine if any significant changes in the incoming traffic characteristics have occurred during the life of the connection. If so, module 33 notifies connection agent 32 to request a new bandwidth allocation, supplying connection agent with the new traffic parameters required for the connection.

The traffic characteristics measured for use in *Derby*'s adaptation process are listed in col. 7, lines 4-43, pertain to all the traffic on the connection, and most significantly do NOT include achieved bandwidth of a particular data flow of packets.

Thus, the above paragraph teaches at most monitoring the incoming traffic for the entire connection to determine whether *significant changes* in the traffic characteristics of the incoming traffic have occurred. If such significant changes have occurred, a new bandwidth request is made for a new bandwidth allocation for the entire connection. Significantly, *Derby et al.* in general and the above paragraph in particular do not teach that the achieved bandwidth of the incoming traffic is measured or determined in any way, let alone teach that the achieved bandwidth of a particular data flow of packets with common characteristics within the incoming traffic is being measured or determined. For this reason, *Derby et al.* does not disclose the element of Claim 1 that recites "determining an achieved flow bandwidth for the data flow based on data traffic within the network."

Claim 1 also recites "marking a second group of one or more packets of said data flow with said second behavioral treatment value, wherein the second behavioral treatment value directs devices within the network to treat the second group of one or more packets with a second quality of service treatment." Neither *Derby et al.* nor *Fichou et. al.*, either individually or in combination, teaches, describes or suggests this element.

The Office Action, at page 3, states that this element is disclosed in *Derby et al.* in col. 6, lines 30-34. The Applicants respectfully disagree. *Derby et al.* does not teach taking action on a per-flow basis, only for an entire link. As pointed above, *Derby et al.* describes monitoring the incoming traffic, and if appropriate, requesting an adjustment of the bandwidth of the entire connection. "If the adjustment is accepted, the leaky bucket parameters are updated with the new traffic characteristics and estimation and adaptation

module 33 continues to monitor the incoming traffic, but with the new characteristics." (*Derby et al.*, col. 6, lines 30-34). Thus, the Office Action seems to suggest that the second behavioral treatment value corresponds to the new traffic characteristics for the entire connection, and that the leaky bucket parameters, which are being updated, are included within packets of the incoming traffic. This is incorrect.

Derby et al., expressly states in col. 6, lines 16-19 that "[i]f the connection is accepted, leaky bucket module 34 is activated and supplied with the appropriate parameters to control ***the access*** of the user traffic." (Emphasis added.) Thus, the leaky bucket parameters recited in col. 6, lines 16-19 and 30-34, clearly and unambiguously belong to the leaky bucket module, and not to any data packets of the incoming traffic. For this reason, *Derby et al.* does not teach, describe, or even suggest "marking a second group of one or more packets of said data flow with said second behavioral treatment value...", as required by Claim 1.

Furthermore, neither *Derby et al.* nor *Fichou et al.* describes, teaches or suggests the element in Claim 1 requiring that "***the second behavioral treatment value directs devices within the network to treat the second group of one or more packets with a second quality of service treatment.***"

The Office Action, at page 3, concedes that *Derby et al.* does not explicitly indicate "determining a second behavioral treatment value based on the achieved flow bandwidth for said data flow." The Office Action, however, claims that this step is disclosed in *Fichou et al.* in col. 3, lines 53-60, and col. 5, lines 16-30. Applicants respectfully disagree.

Fichou et al. describes a connection bandwidth management system that relies on "an efficient monitoring of network resources occupancy to re-compute the bandwidth allocated to connections boarded on a given link so that the overall bandwidth capacity of the link is not exceeded, while solving the shortcomings of the conventional oversubscription technique." (*Fichou et al.*, col. 3, lines 53-60.) The conventional oversubscription technique is described as "taking advantage of the statistical multiplexing of connections over the links, [to] allow more connections to be established on a link than a link may theoretically accept with regard to its total bandwidth capacity." (*Fichou et al.*, col. 3, lines 23-26). Further, in col. 5, lines 16-30, *Fichou et al.* states:

> ...[O]ne monitored link is selected and the corresponding link monitoring data are retrieved from the [networking monitoring center] computer memory. The link monitored data retrieved for the selected link is analyzed, and it is determined whether the selected link is oversubscribed or not. If it is determined that the selected link is oversubscribed and that the link monitoring data for the selected link satisfies at least one predetermined condition[,] the bandwidth initially allocated to each of the connections boarded on the selected link is reallocated, such that, the sum of real-located bandwidth of the connections boarded on the selected link is less than or equal to the total bandwidth capacity of the selected link. The process recycles until all the monitored links have been selected.

The above paragraph at most discloses a method of reallocating bandwidth among connections established over a physical data link with a fixed total bandwidth capacity. Neither this paragraph in particular, nor *Fichou et al.* in general, teaches or describes determining a behavioral treatment value based on achieved flow bandwidth for a particular data flow of packets. A behavioral treatment value pertains to a collection of packets with common characteristics that determine how the packets are identified and treated by the network. (See Application, page 5, lines 9-12.) In contrast, *Fichou et al.* describes re-allocation of bandwidth for connections established on the same physical

link, and does not teach, describe, or suggest that each connection carries only packets with common characteristics. Significantly, *Fichou et al.* does not provide for action on a per-flow basis.

For this reason, the Applicants respectfully submit that *Fichou et al.* does not describe "determining a second behavioral treatment value based on the achieved flow bandwidth for said data flow," as required by Claim 1.

B. There is no suggestion or motivation to combine the teachings of *Derby et al.* with *Fichou et al.* because the proposed modification would change the principle of operation of *Derby et al.*

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959); MPEP § 2143.01.

The Office Action, at page 3, states that the motivation to modify the *Derby et al.* system according to the teachings of *Fichou et al.* is "to allow the network to monitor and identify oversubscription and have a better control in dealing with both situations." The Office Action cites *Fichou et al.*, col. 3, lines 27-50 to support this proposition. Applicants respectfully disagree.

Fichou et al. describes that the shortcoming of oversubscription is the inability to handle unexpected bursts of traffic on a particular connection, which may cause unpredictable congestion on the link on which the connection is boarded. (See *Fichou et al.*, col. 3, lines 27-33.) As described above, the solution *Fichou et al.* proposes is to re-compute and re-allocate, when certain conditions are met, the bandwidth of ***all***

connections boarded on the same link so that the sum of the real-located bandwidth of the connections boarded on the same physical link is less than or equal to the total bandwidth capacity of the link. (*Fichou et al.*, col. 5, lines 16-30.)

Derby et al., on the other hand, describes a system in which dynamic adaptation, of a traffic control system, with respect to changes in traffic characteristics is provided by defining a region ***within which adaptation is not required*** and ***outside of which a new bandwidth allocation must be requested***. (*Derby et al.*, col. 19-24.) When the traffic characteristics fall outside the desired adaptation region, either a new bandwidth is allocated to the connection (*Derby et al.*, col. 6, lines 34-36), or a new connection with a different bandwidth is requested in order to accommodate the changes in the traffic characteristics (*Derby et al.*, col. 3, lines 53-56).

Thus, if the teachings of *Fichou et al.* are applied to the *Derby* system, then when the traffic characteristics of a particular connection in the *Derby* system exceed the connection adaptation region, the system must re-compute and re-allocate the bandwidth allocation of ***all*** other connections on the same link ***regardless*** of whether the traffic characteristics of these other connections have exceeded their corresponding adaptation regions or not. The *Derby* system MUST re-compute the bandwidth allocation of all connections on the same link every time the traffic parameters of any connection on the link exceeds its adaptation region, because according to *Fichou et al.* the sum of the real-located bandwidth of the connections boarded on the same physical link MUST BE less than or equal to the total bandwidth capacity of the link. For this reason, applying *Fichou et al.* to *Derby* would violate the principle of operation of *Derby*, which requires that a

connection is allocated new bandwidth ***only*** when the connection's traffic characteristics change and fall outside the adaptation region defined for the connection.

IV. INDEPENDENT CLAIMS 24, 41 AND 58

Independent claims 24, 41, and 58 include substantially similar language to claims 1, 5, 9, 13, and 14, and are allowable for same reasons discussed above. Additionally, claims 24, 41, and 58 recite:

> marking a first group of packets of ***a plurality of data flows*** with an initial set of behavioral treatment values, wherein the first set of behavioral treatment values direct devices within the network to treat the first group packets with an initial set of quality of service treatments;
> determining achieved flow bandwidths, wherein ***an achieved flow bandwidth is determined for each of the plurality of data flows*** based on data traffic within the network;
> determining an updated set of behavioral treatment values based on the achieved flow bandwidths within the network.

Thus, claims 24, 41, and 58 recite a plurality of data flows for which achieved flow bandwidths are determined.

The Office Action, at page 5, states that *Derby et al.* discloses in col. 6, lines 21-27 "determining an achieved flow bandwidth for the data flow based on data traffic within the network." The Applicants disagree.

As discussed above, *Derby et al.*, in col. 6, lines 21-27 recites monitoring the incoming traffic for the connection to determine whether any significant changes in the incoming traffic characteristics have occurred during the life of the connection. Further, in col. 6, lines 29-30, *Derby et al.* describes performing an "***adjustment of the bandwidth of the connection***", and thereby discloses changing the bandwidth of the entire connection, and does not disclose determining or measuring the achieved bandwidth of a

plurality of data flows in the connection. For this additional reason, *Derby et al.* does not disclose determining of achieved bandwidth for a plurality of data flows.

Furthermore, *Fichou et al.* does not disclose this element either, because, as pointed out above, *Fichou et al.* does not describe re-computing the achieved bandwidth of a particular data flow or data flows, but only describes re-computing of the bandwidths of all connections that are boarded on the same physical link. For this additional reason, the element recited in Claims 24, 41, and 58 requiring "determining achieved flow bandwidths, wherein an achieved flow bandwidth is determined for each of the plurality of data flows ..." is not described in *Derby et al.* and *Fichou et al.*, taken individually or in combination.

V. INDEPENDENT CLAIMS 25, 42 AND 59

Independent Claims 25, 42, and 59 include similar language to Claims 1, 5, 9, 13, and 14, and are allowable for same reasons discussed above. In particular, Claims 25, 42, and 59 recite:

> estimating traffic bandwidth within the network based on bandwidth information corresponding to a current traffic pattern of the network, wherein the ***traffic bandwidth estimated includes an achieved flow bandwidth for the given data flow***;
>
> determining an ***updated set of QoS values*** for coloring packets within the plurality of data flows, ***based on the traffic bandwidth estimated*** ...;
>
> ***coloring*** a subsequent group of one or more packets of the given data flow ***with the one or more of updated set of QoS values*** ... .

As discussed above, *Derby et al.* and *Fichou et al.*, when taken individually or in combination, do not disclose: (1) determining an achieved bandwidth for a given data traffic flow based on data traffic within the network, (2) determining a second behavioral

treatment value for the given data flow (in the case of Claims 25, 42, and 59, this would be the updated set of QoS values), and (3) marking a subsequent group of one or more data packets of the given data flow with the second behavioral treatment value (in the case of Claims 25, 42, and 59, this would be coloring the subsequent packet group with the updated set of QoS values). Furthermore, the Office Action does not assert, and the Applicants cannot determine, that *Koskelainen et al.* teaches, describes, or suggests the above elements that were not disclosed in *Derby et al.* and *Fichou et al.* For this reason, *Derby et al.* and *Fichou et al*, and further in view of *Koskelainen et al.*, when taken individually or in combination, fail to teach, describe, or disclose all elements recited in Claims 25, 42, and 58.

Claims 25, 42, and 58 further recite

> communicating *the initial set of QoS* values ***to each of one or more edge differentiated services domain nodes that are located at one or more edges of a differentiated services domain***, and
> the ***one or more edge differentiated services domain nodes*** using one or more of *the initial set of QoS values to color the first group*;
>
> communicating the *updated set of QoS values* ***to each of one or more edge differentiated services domain nodes***, and
> the ***one or more edge differentiated services domain nodes*** using one or more of *the updated set of QoS values to color the subsequent group*;

The Office Action asserts that the elements, recited in claims 25, 42, and 58, requiring transmission and use of a set of QoS values by each of one or more differentiated services domain nodes that are located at one or more edges of a differentiated services domain, are recited in col. 5, lines 47-65 of *Derby et al.* The Applicants respectfully disagree.

The paragraph in *Derby et al.*, in col. 5, lines 47-65 describes making an initial estimation of traffic characteristics (which may include QoS estimate) for a new connection before the connection is established, sending the estimate to the bandwidth

management system, and calculating possible a path through the network on the basis of the estimate. Nothing in this passage describes a network that includes a differentiated services domain, let alone describe coloring of data flow packets by differentiated services domain nodes that are located at one or more edges of such domain. Similarly, the passage in col. 6, lines 28-34 of *Derby et al.*, which the Office Action alleges to be describing coloring data flow packets with updated QoS values by differentiated services domain nodes, only describes adjusting the bandwidth of a connection based on the new traffic characteristics, and the subsequent monitoring of the connection based on the new traffic characteristics. Nothing in this passage even suggests a network with differentiated services domain or coloring of data packets by nodes located on the edges of such domain.

For these reasons, the Applicants respectfully submit that *Derby et al.* and *Fichou et al.*, and further in view of *Koskelainen et al.*, when taken individually or in combination, fail to teach, describe, or suggest all elements recited in Claims 25, 42, and 58.

Furthermore, a proposed combination of *Derby et al.* and *Koskelainen et al.* would totally obviate the need to use the teachings of *Derby et al. Derby et al.* addresses problems that arise specifically when using a leaky bucket system in conjunction with bandwidth estimation and adaptation in a network. Consequently, if one of ordinary skill has decided to use a Differentiated Services Code Point (DSCP) system, such as the system described in *Koskelainen et al.*, to effectuate a Quality-Of-Service treatment of packet flows in a network, that hypothetical person would no longer have seen any reason or have any need to use a leaky bucket system, for the problems of which *Derby et al.*

proposes a solution. Thus, there is no suggestion or motivation to combine *Derby et al.* with *Koskelainen et al.*

For the reasons stated above, it is respectfully submitted that claims 25, 42, and 59 are not obvious under 35 U.S.C. § 103(a) over *Derby et al.* in view of *Fichou et al.*, and further in view of *Koskelainen et al.*

VI. DEPENDENT CLAIMS 2-4, 6-8, 10-12, 15-23, 26-40, 43-57, AND 60-65

Claims 2-4, 6-8, 10-12, 15-23, 26-40, 43-57, and 60-65 are dependent upon one of independent claims 1, 5, 9, 13, 14, 24, 25, 41, 42, 58, and 59, and thus include each and every feature of their corresponding independent claims. Each of claims 2-4, 6-8, 10-12, 15-23, 26-40, 43-57, and 60-65 is therefore allowable for the reasons given above for its corresponding independent claim. In addition, each of claims 2-4, 6-8, 10-12, 15-23, 26-40, 43-57, and 60-65 introduces one or more additional elements that independently render it patentable. However, due to the fundamental differences already identified, to expedite the positive resolution of this case a separate discussion of those limitations is not included at this time. Therefore, it is respectfully submitted that Claims 2-4, 6-8, 10-12, 15-23, 26-40, 43-57, and 60-65 are allowable at least for the reasons given above with respect to Claims 1, 5, 9, 13, 14, 24, 25, 41, 42, 58, and 59.

VII. CONCLUSION

For the reasons set forth above, all pending claims are patentable over the art of record. Accordingly, allowance of all claims is hereby respectfully solicited.

The Examiner is respectfully requested to contact the undersigned by telephone if it is believed that such contact would further the examination of the present application.

No extension fee is believed to be due. However, to the extent necessary, Applicants petition for an extension of time under 37 C.F.R. § 1.136. If any applicable fee is missing or insufficient, throughout the pendency of this application, the Commissioner is hereby authorized to charge any applicable fees and to credit any overpayments to our Deposit Account No. 50-1302.

Respectfully submitted,

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On: January 4, 2005 by Teresa Austin